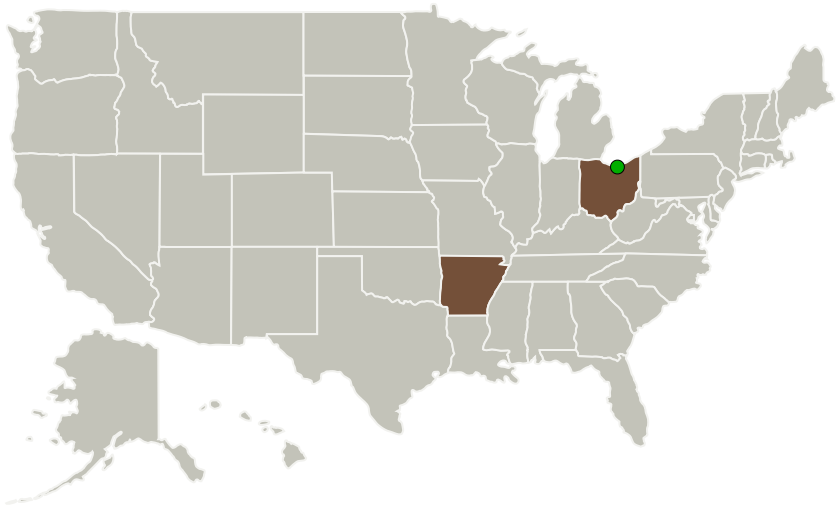
Silicon Carbide (SiC) Power Processing Unit (PPU) for Hall Effect Thrusters, Phase I

Completed Technology Project (2010 - 2010)

Project Introduction

In this SBIR project, APEI, Inc. is proposing to develop a high efficiency, rad-hard 3.8 kW silicon carbide (SiC) Power Processing Unit (PPU) for Hall Effect thrusters. In Phase I of the project, APEI, Inc. will focus on investigating various circuit topologies, developing and applying performance metrics (i.e., optimizing magnetics, passives, frequencies, power density, efficiency, etc.), and developing a complete electric circuit design. By the conclusion of Phase I, APEI, Inc. will build and test a hardware "proof of concept" 1.3 kW power converter demonstrating the feasibility of the concepts proposed in this program. In Phase II of the project, APEI, Inc. will transition the "proof of concept" converter of Phase I into a higher power 3.8 kW interleaved system (paralleling three 1.3 kW converters), will modify the basic circuit design demonstrated in Phase I to include full control functionality and feedback / protection circuitry, and will integrate space qualified control and feedback components for a complete rad-hard system.

Primary U.S. Work Locations and Key Partners



Silicon Carbide (SiC) Power Processing Unit (PPU) for Hall Effect Thrusters, Phase I

Table of Contents

Silicon Carbide (SiC) Power Processing Unit (PPU) for Hall Effect Thrusters, Phase I

Completed Technology Project (2010 - 2010)

Organizations Performing Work	Role	Type	Location
Arkansas Power Electronics International, Inc.	Lead Organization	Industry	Fayetteville, Arkansas
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Arkansas	Ohio

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140032)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Arkansas Power Electronics International, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

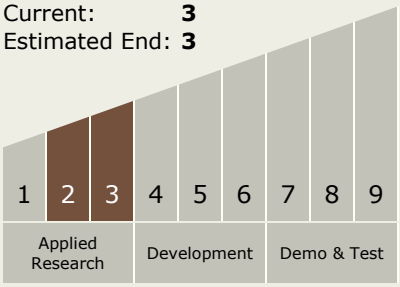
Carlos Torrez

Principal Investigator:

Roberto Schupbach

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Silicon Carbide (SiC) Power Processing Unit (PPU) for Hall Effect Thrusters, Phase I

Completed Technology Project (2010 - 2010)

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.2 Electric Space Propulsion
    - TX01.2.2 Electrostatic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System